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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/776,321	02/12/2004	Mark F. Eldridge	9-16313-2US	4097

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EXAMINER

SUN, XIUQIN

ART UNIT	PAPER NUMBER
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2863

DATE MAILED: 08/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/776,321

Applicant(s)

ELDRIDGE, MARK F.

Examiner

Xiuqin Sun

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 June 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-59 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 31,32 and 34-43 is/are allowed.
- 6) ☒ Claim(s) 1-3,25-30,44,45,51-54,56 and 57 is/are rejected.
- 7) ☒ Claim(s) 4-24,46-50,55,58 and 59 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892) -
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 26 and 30 are rejected under 35 U.S.C. 102(b) as being anticipated by Djorup (U.S. Pat. No. 3995481).

Regarding claim 1, Djorup teaches a thermal mass flowmeter (Abstract; col. 1, lines 7-12 and 37-42) comprising: means for providing a flow ratio signal and a temperature ratio signal (Fig. 14; col. 1, lines 43-59; col. 6, lines 38-46 and 61-63); means for applying an overheat factor to the flow ratio signal or the temperature ratio signal (col. 6, lines 48-52); means for applying a temperature correction factor to the flow ratio signal or the temperature ratio signal (col. 6, lines 52-63); and means for balancing the flow ratio signal and temperature ratio signal, wherein the temperature correction factor is determined by a predefined function of a temperature of a fluid (col. 6, lines 52-63).

Regarding claims 26 and 30, Djorup further teaches: wherein the the temperature ratio signal is a substantially linear function of the temperature of the fluid (Fig. 14; col.

6, lines 44-48); a type of the predefined function is chosen from a list consisting of linear, quadratic, cubic, and piece-wise linear (col. 6, lines 64-68).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2, 3, 28 and 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Djorup (U.S. Pat. No. 3995481) in view of Gee (U.S. Pub. No. 20030212510).

Djorup teaches the thermal mass flowmeter that includes the subject matter discussed above. Djorup further teaches: regarding claims 2, a bridge thermally connectable to the fluid (col. 1, lines 7-12; col. 6, lines 38-40); regarding claims 3, 28 and 29, the bridge is a Wheatstone bridge (col. 6, lines 38-40); the flow bridge signal is a substantially linear function of a flow rate of the fluid (Fig. 14; col. 6, lines 61-63); the means for balancing comprises means for converting the flow bridge signal for providing a flow rate signal (col. 6, lines 52-63).

Djorup does not mention expressly: a signal conditioner for conditioning signals from the bridge to provide a flow sensor signal, a flow bridge signal, a temperature sensor signal and a temperature bridge signal; and means for dividing the flow sensor signal by the flow bridge signal and means to divide the temperature sensor signal by

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the temperature bridge signal to provide the flow ratio signal and temperature ratio signal respectively.

Gee teaches a mass flowmeter, including a flow ratio signal and a temperature ratio signal which comprise: a signal conditioner for conditioning signals from the bridge to provide a flow sensor signal, a flow bridge signal, a temperature sensor signal and a temperature bridge signal (sections 0009 and 0029-0035); and means for dividing the flow sensor signal by the flow bridge signal and means to divide the temperature sensor signal by the temperature bridge signal to provide the flow ratio signal and temperature ratio signal respectively (sections 0009 and 0029-0035).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include the teaching of Gee in the invention of Djorup in order to provide a self-consistent mechanism for configuring the thermal-type mass flowmeter to generate a temperature compensated flow measurement (Gee, section 0008).

4. Claims 25 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Djorup (U.S. Pat. No. 3995481) in view of Bonne et al. (U.S. Pat. No. 5237523).

Djorup teaches the thermal mass flowmeter that includes the subject matter discussed above. Djorup does not disclose: regarding claim 25, said means for balancing the flow ratio signal and the temperature ratio signal comprises means for applying a predetermined gas compensation factor to the flow ratio signal or the temperature ratio signal; regarding claim 27, means for converting the temperature ratio signal for providing a temperature signal.

Bonne et al. teach a flowmeter that is capable of correcting for changes in fluid temperature, including: means for applying a predetermined gas compensation factor to the flow ratio signal or the temperature ratio signal for correcting the measured volumetric flow (col. 2, lines 45-58 and col. 4, lines 59-65); means for converting the temperature ratio signal for providing a temperature signal (col. 5, lines 9-27).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teaching of Bonne et al. into the invention of Djorup in order to provide a mechanism for correcting the flowmeter for changes in composition and temperature of the fluid (Bonne et al., Abstract).

5. Claims 44, 45 and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Djorup (U.S. Pat. No. 3995481) in view of Seki et al. (U.S. Pub. No. 20040025585).

Regarding claim 44, Djorup teaches a method for determining a flow rate of a fluid comprising the steps of: thermally connecting to a bridge to the fluid (col. 1, lines 7-12; col. 6, lines 38-40); applying an overheat factor to the flow ratio signal or the temperature ratio signal (col. 6, lines 48-52); applying a temperature correction factor determined by a predefined function of a temperature of the fluid to the flow sensor signal or the temperature sensor signal (col. 6, lines 52-63); and balancing the flow sensor signal and the temperature sensor signal (col. 6, lines 52-63).

Djorup does not mention expressly: applying an overheat factor to a flow sensor signal or a temperature sensor signal wherein the overheat factor is a predetermined constant representing a difference in temperature across the bridge.

Seki et al. disclose a flow sensor and method of manufacturing the same, and teach the step of: applying an overheat factor to a flow sensor signal or a temperature sensor signal wherein the overheat factor is a predetermined constant representing a difference in temperature across the bridge (sections 0048-0052).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teaching of Seki et al. into the invention of Djorup in order to form a constant temperature difference circuit for operating the bridge circuit of the flow sensor (Seki et al., section 0048).

Regarding claims 45 and 54, Djorup further teaches: said bridge is a Wheatstone bridge (col. 6, lines 38-40); determining the flow rate using the bridge signal (col. 6, lines 61-63).

6. Claim 51 is rejected under 35 U.S.C. 103(a) as being unpatentable over Djorup in view of Seki et al., as applied to claim 44 above, and further in view of Bonne et al. (U.S. Pat. No. 5237523).

Djorup and Seki et al. teach the thermal mass flowmeter that includes the subject matter discussed above. The Djorup-Seki combination does not disclose: regarding claim 51, adjusting the flow signal or the temperature signal by a predetermined gas compensation factor.

Bonne et al. teach a flowmeter that is capable of correcting for changes in fluid temperature, including: means for applying a predetermined gas compensation factor to the flow ratio signal or the temperature ratio signal for correcting the measured

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volumetric flow (col. 2, lines 45-58 and col. 4, lines 59-65); means for converting the temperature ratio signal for providing a temperature signal (col. 5, lines 9-27).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teaching of Bonne et al. into the combination of Djorup-Seki in order to provide a mechanism for correcting the flowmeter for changes in composition and temperature of the fluid (Bonne et al., Abstract).

7. Claims 52 and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Djorup (U.S. Pat. No. 3995481) in view of Seki et al., as applied to claim 44 above, and further in view of Gee (U.S. Pub. No. 20030212510).

Djorup and Seki et al. teach the thermal mass flowmeter that includes the subject matter discussed above. The Djorup-Seki combination does not mention expressly: the step of applying the temperature correction factor to the flow sensor signal or the temperature sensor signal comprises a step of determining the temperature of the fluid using a ratio of the temperature sensor signal and a temperature bridge signal; regarding claim 56, determining the temperature of the fluid using the temperature sensor signal.

Gee teaches a mass flowmeter, including a flow ratio signal and a temperature ratio signal which comprise: means for dividing the flow sensor signal by the flow bridge signal and means to divide the temperature sensor signal by the temperature bridge signal to provide the flow ratio signal and temperature ratio signal respectively (sections 0009 and 0029-0035); and determining the temperature of the fluid using the temperature sensor signal (sections 0009 and 0029-0035).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include the teaching of Gee in the combination of Djorup and Seki in order to provide a self-consistent mechanism for configuring the thermal-type mass flowmeter to generate a temperature compensated flow measurement (Gee, section 0008).

8. Claims 53 and 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Djorup (U.S. Pat. No. 3995481) in view of Seki et al. (U.S. Pub. No. 20040025585), as applied to claim 44 above, and further in view of Suzuki (U.S. Pat. No. 6230560).

Djorup and Seki et al. teach a method for determining a flow rate of a fluid that includes the subject matter discussed above. The Djorup-Seki combination does not mention explicitly: determining the temperature of the fluid using a thermometer.

Suzuki teaches a flow measuring device and flow measuring method, including the step and means for determining the temperature of the fluid using a thermometer (col. 20, lines 32-67 and col. 21, lines 1-19).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include the teaching of Suzuki in the Djorup-Seki combination as a conventional and low-cost approach to accurately measure the temperature of a fluid (Suzuki, col. 20, lines 32-67 and col. 21, lines 1-19).

Allowable Subject Matter

9. Claims 4-24, 46-50, 55, 58 and 59 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. Claims 31, 32 and 34-43 are allowed.

Reasons for Allowance

11. The following is an examiner's statement of reasons for allowance:

The primary reason for the allowance of claims 4, 7-19, 58 and 59 is the inclusion of the limitations that a flow reference impedance and a flow sensor resistance temperature detector (RTD) for dividing a bridge signal according to a relative impedance of the flow reference impedance and the flow sensor RTD; and a temperature reference impedance and a temperature sensor RTD for dividing the bridge signal according to a relative impedance of the temperature reference impedance and the temperature sensor RTD. It is these limitations found in each of the claims, as they are claimed in the combination that have not been found, taught or suggested by the prior art of record, which make these claims allowable over the prior art.

The primary reason for the allowance of claims 5, 6 and 20-23 is the inclusion of the limitations that a flow reference impedance and a flow sensor resistance temperature detector (RTD) for dividing a bridge signal according to a relative impedance of the flow reference impedance and the flow sensor RTD; and a thermometer for determining the temperature of the fluid and providing a temperature

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signal. It is these limitations found in each of the claims, as they are claimed in the combination that have not been found, taught or suggested by the prior art of record, which make these claims allowable over the prior art.

The primary reason for the allowance of claim 24 is the inclusion of the limitation that the means for balancing the flow ratio signal and the temperature ratio signal comprises means for substituting a predefined virtual temperature signal for the temperature ratio signal. It is this limitation found in the claim, as it is claimed in the combination that has not been found, taught or suggested by the prior art of record, which makes this claim allowable over the prior art.

The primary reason for the allowance of claims 31, 32 and 34-43 is the inclusion of the limitation that the step of determining respective values of the temperature calibration factor comprises a step of balancing a flow ratio signal and a temperature ratio signal at each temperature using the respective temperature calibration factor. It is this limitation found in each of the claims, as it is claimed in the combination that has not been found, taught or suggested by the prior art of record, which makes these claims allowable over the prior art.

The primary reason for the allowance of claims 46 and 55 is the inclusion of the limitation that the step of conditioning signals using a signal conditioner comprises steps of canceling losses in a three-wire connection and providing a flow bridge signal and the flow sensor signal. It is this limitation found in each of the claims, as it is claimed in the combination that has not been found, taught or suggested by the prior art of record, which makes these claims allowable over the prior art.

The primary reason for the allowance of claim 47 is the inclusion of the limitation that the step of conditioning signals using a signal conditioner comprises steps of canceling losses in a three-wire connection and providing a temperature bridge signal and the temperature sensor signal. It is this limitation found in the claim, as it is claimed in the combination that has not been found, taught or suggested by the prior art of record, which makes this claim allowable over the prior art.

The primary reason for the allowance of claim 48 is the inclusion of the limitation that the step of conditioning signals using a signal conditioner comprises steps of canceling losses in a four-wire connection and providing a flow bridge signal and a flow sensor signal. It is this limitation found in the claim, as it is claimed in the combination that has not been found, taught or suggested by the prior art of record, which makes this claim allowable over the prior art.

The primary reason for the allowance of claim 49 is the inclusion of the limitation that the step of conditioning signals using a signal conditioner comprises steps of canceling losses in a four-wire connection and providing a temperature bridge signal and a temperature sensor signal. It is this limitation found in the claim, as it is claimed in the combination that has not been found, taught or suggested by the prior art of record, which makes this claim allowable over the prior art.

The primary reason for the allowance of claim 50 is the inclusion of the limitation that the step of balancing the flow sensor signal and the temperature sensor signal circuit comprises a step of substituting a predefined virtual temperature signal for the temperature sensor signal. It is this limitation found in the claim, as it is claimed in the

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combination that has not been found, taught or suggested by the prior art of record, which makes this claim allowable over the prior art.

The primary reason for the allowance of claim 55 is the inclusion of the limitation that the step of determining the flow rate using the flow bridge signal. It is this limitation found in the claim, as it is claimed in the combination that has not been found, taught or suggested by the prior art of record, which makes this claim allowable over the prior art.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

11. Applicant's arguments received 6/20/05 with respect to claims 1-3, 25-30, 44, 45, 51-54, 56 and 57 have been considered but are moot in view of the new ground(s) of rejection.

Claims 1-3, 25-30, 44, 45, 51-54, 56 and 57 are rejected as new prior art references (U.S. Pat. No. 3995481 to Djorup and U.S. Pub. No. 20040025585 to Seki et al.) have been found to teach the claimed subject matter recited in these claims. Detailed response is given in sections 1-8 as set forth above in this Office Action.

Contact Information

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12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Xiuqin Sun whose telephone number is (571)272-2280.

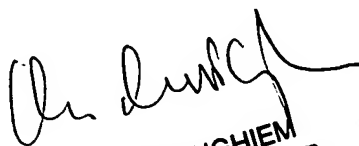
The examiner can normally be reached on 6:30am-4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Barlow can be reached on (571)272-2269. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Xiuqin Sun
Examiner
Art Unit 2863

XS
August 9, 2005


MICHAEL NGHIEM
PRIMARY EXAMINER